

WHAT IS CLAIMED IS:

1. A communication network designing circuit for multiple point communication service for permitting arbitrary communication within a predetermined range by providing a traffic amount of data inflowing from an ingress node through which data flow in from other network and a traffic amount of data flowing out from an egress node through which data is fed to other network, in an object network consisted of a plurality of nodes and connected to other network, comprising:
  - 10 setting means for setting a mathematical programming problem for deriving said multiple point communication service; and
  - 15 optimizing means for solving the mathematical programming problem set by said setting means and obtaining a path for said multiple point communication service.
2. A communication network designing circuit as set forth in claim 1, wherein said path for said multiple point communication service is derived on the basis of preliminarily set optimization standard.
3. A communication network designing circuit as set forth in claim 1, wherein said setting means comprises:
  - 25 optimization reference generating means for setting an objective function for minimizing a link load in said object

network and serving as an optimization reference and setting  
a constraint expression for deriving said link load;

route selecting condition generating means for generating  
a constraint expression for selecting a route for including  
5 traffic of data inflowing from other network;

per-user necessary link capacity calculating condition  
generating means for generating a constraint expression for  
calculating a necessary link band of each link per traffic of  
data inflowing from each ingress node; and

10 link including condition generating means for generating  
a constraint expression so as not to exceed a link capacity  
limit in each link.

4. A communication network designing circuit as set forth  
15 in claim 3, wherein each means in said setting means performs  
on process in parallel relative with each other.

5. A communication network designing method for multiple  
point communication service for permitting arbitrary  
20 communication within a predetermined range by providing a  
traffic amount of data inflowing from an ingress node through  
which data flow in from other network and a traffic amount of  
data flowing out from an egress node through which data is fed  
to other network, in an object network consisted of a plurality  
25 of nodes and connected to other network, comprising:

setting step of setting a mathematical programming problem  
for deriving said multiple point communication service; and

optimizing step of solving the mathematical programming  
problem set in said setting step and obtaining a path for said  
5 multiple point communication service.

6. A communication network designing method as set forth  
in claim 5, wherein said path for said multiple point  
communication service is derived on the basis of preliminarily  
10 set optimization standard.

7. A communication network designing method as set forth  
in claim 5, wherein said setting step comprises:

optimization reference generating step of setting an  
15 objective function for minimizing a link load in said object  
network and serving as an optimization reference and setting  
a constraint expression for deriving said link load;

route selecting condition generating step of generating  
a constraint expression for selecting a route for including  
20 traffic of data ng from other network;

per-ser necessary link capacity calculating condition  
generating step of generating a constraint expression for  
calculating a necessary link band of each link per traffic of  
data inflowing from each ingress node; and

25 link including condition generating step of generating

a constraint expression so as not to exceed a link capacity limit in each link.

8. A communication network designing method as set forth  
5 in claim 7, wherein each sub-step in said setting step performs on process in parallel relative with each other.

9. A storage medium storing a communication network design control program for designing a communication network for  
10 multiple point communication service for permitting arbitrary communication within a predetermined range by providing a traffic amount of data inflowing from an ingress node through which data flow in from other network and a traffic amount of data flowing out from an egress node through which data is fed  
15 to other network, in an object network consisted of a plurality of nodes and connected to other network, said communication network design control program comprising:

setting step of operating a computer for setting a mathematical programming problem for deriving said multiple  
20 point communication service; and

optimizing step of operating said computer for solving the mathematical programming problem set in said setting step and obtaining a path for said multiple point communication service.

10. A storage medium as set forth in claim 9, wherein said communication network design control program operates said computer for deriving said path for said multiple point communication service on the basis of preliminarily set  
5 optimization standard.

11. A storage medium as set forth in claim 9, wherein said setting step in said communication network design control program comprises:

10 optimization reference generating step of operating said computer for setting an objective function for minimizing a link load in said object network and serving as an optimization reference and setting a constraint expression for deriving said link load;

15 route selecting condition generating step of operating said computer for generating a constraint expression for selecting a route for including traffic of data inflowing from other network;

per-ser necessary link capacity calculating condition  
20 generating step of operating said computer for generating a constraint expression for calculating a necessary link band of each link per traffic of data inflowing from each ingress node; and

link including condition generating step of operating  
25 said computer for generating a constraint expression so as not

to exceed a link capacity limit in each link.

12. A storage medium as set forth in claim 11, wherein each  
sub-step in said setting step performs on process in parallel  
5 relative with each other.

13. A transmission medium transmitting a communication  
network design control program for designing a communication  
network for multiple point communication service for permitting  
10 arbitrary communication within a predetermined range by  
providing a traffic amount of data inflowing from an ingress  
node through which data flow in from other network and a traffic  
amount of data flowing out from an egress node through which  
data is fed to other network, in an object network consisted  
15 of a plurality of nodes and connected to other network, said  
communication network design control program comprising:

setting step of operating a computer for setting a  
mathematical programming problem for deriving said multiple  
point communication service; and

20 optimizing step of operating said computer for solving  
the mathematical programming problem set in said setting step  
and obtaining a path for said multiple point communication  
service.

25 14. A transmission medium as set forth in claim 13, wherein

said communication network design control program operates said computer for deriving said path for said multiple point communication service on the basis of preliminarily set optimization standard.

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15. A transmission medium as set forth in claim 13, wherein said setting step in said communication network design control program comprises:

optimization reference generating step of operating said  
10 computer for setting an objective function for minimizing a link load in said object network and serving as an optimization reference and setting a constraint expression for deriving said link load;

route selecting condition generating step of operating  
15 said computer for generating a constraint expression for selecting a route for including traffic of data flowing from other network;

per-ser necessary link capacity calculating condition  
generating step of operating said computer for generating a  
20 constraint expression for calculating a necessary link band of each link per traffic of data inflowing from each ingress node; and

link including condition generating step of operating  
said computer for generating a constraint expression so as not  
25 to exceed a link capacity limit in each link.

16. A transmission medium as set forth in claim 15, wherein each sub-step in said setting step performs on process in parallel relative with each other.